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UNITED STATES
DEPARTMENT OF THE INTERIOR
HAROLD L. ICKES, SECRETARY

BUREAU OF MINES
JOHN W. FINCH, DIRECTOR

INFORMATION CIRCULAR

FATALITIES IN ILLINOIS COAL MINES, 1934-36

BY

A. U. MILLER

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UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

FATALITIES IN ILLINOIS COAL MINES, 1934-36[1]

By A. U. Miller[2]

Definite progress has been made in accident prevention in Illinois during the past few years; the State Department of Mines and Minerals is receiving excellent cooperation from coal companies and employees, the companies are making greater effort to maintain their mines in good condition, and the employees are eliminating more unsafe practices. As a result, some coal companies have made commendable safety records that prove that coal can be mined with a comparatively low accident rate. However, there is need for further improvement, as the accident rate of the State as a whole is much higher than it should be. During the 55-year period 1882-1936, inclusive, reports of the State Department of Mines and Minerals show a total of 7,005 (an average of 127.36 per year) men killed in and around the coal mines. Of this number, 6,425 (91.7 percent) were killed underground, 346 (4.9 percent) in the shaft, and 234 (3.3 percent) on the surface. Of the fatalities underground, 3,300 (51.3 percent) were killed by falls of roof, sides, or face coal, 1,167 (18.1 percent) by haulage, 639 (9.9 percent) by handling explosives, 579 (9 percent) by explosions, 151 (2.3 percent) by electricity, and 589 (9.1 percent) by other means. Of the fatalities in the shaft, 171 men (46.5 percent) were killed by falling down the shaft, 144 (41.6 percent) by the cage, and 31 (8.9 percent) otherwise. On the surface, 113 (48.2 percent) of the fatalities were due to railroad cars, 51 (21.7 percent) to machinery, and 70 (29.9 percent) to other causes.

The fact that 7,005 lives (an average of 127.36 per year) were lost during 1882-1936 is sufficient evidence that in the past too little interest has been taken in safety by either the management or workers. A realization of this deplorable loss of life should act as an incentive to the industry to make greater effort to prevent accidents in the future.

After an accident occurs, the facts pertaining to it become history, and anything that may be done afterward cannot change in any way the damage that has already been done, such as loss of life, personal injury, and destruction of property. The main benefit that can be derived from an accident is that suitable procedure may be adopted and some lesson may be learned to aid in preventing a similar accident in the future. All accidents, particularly serious ones, therefore should be investigated and an effort made

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to obtain all the pertinent information possible, after which suitable recommendations should be made and better practices adopted to prevent similar accidents in the future. Unless this procedure is followed, there is little likelihood that the mining industry will make the progress in accident prevention that it should.

ACKNOWLEDGMENT

Through the courtesy of James McSherry, director of the State Department of Mines and Minerals of Illinois, it was possible to study the fatalities reported by the district inspectors for 1934, 1935, and 1936. The purpose of the study was to determine and discuss the causes of the fatalities so that the mining industry not only of Illinois but of other States as well might take steps to prevent fatalities from similar causes in the future.

FATALITIES

The reports show that 261 men were killed in the 3-year period - 86 in 1934, 82 in 1935, and 93 in 1936. Tables 1 to 12 show the fatalities, classified as to causes and occupations for each year and for the 3-year period

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TABLE 1. - Fatalities, by causes and occupations, 1938

Causes	Occupations: Underground: Hand loaders	Loading-machine operators	Loading-machine helpers	Conveyor loaders	Cutting-machine operator	Cutting-machine helper	Drillers and snubbers	Timbermen	Track layers	Motormen	Trip riders	Drivers	Pumpmen	Electricians	Company men	Foremen	Shot firers	Total	Surface: Oilers	Laborers	Blacksmith	Engineer	Miner	Total surface	Total surface and underground
Underground:																									
Falls roof, face, sides	19	3	2	4	3	1	1	5	2	2	1	1	3	-	-	-	-	47	-	-	-	-	-	-	47
Caught between cars	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	2	-	-	-	-	-	-	2
Run over by cars or motors	1	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	3	-	-	-	-	-	-	3
Fell off front end of cars	-	-	-	-	-	-	-	-	-	-	1	4	-	-	-	-	-	5	-	-	-	-	-	-	5
Runaway cars	3	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	5	-	-	-	-	-	-	5
Lack clearance	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	1	-	3	-	-	-	-	-	-	3
Electricity	2	-	-	1	-	-	-	-	1	-	1	-	-	1	-	-	-	6	-	-	-	-	-	-	6
Machinery	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	2
Shots	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	2	-	-	-	-	-	-	2
Handling explosives	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1
Miscellaneous	1	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	3	-	-	-	-	-	-	3
Total underground	27	3	2	6	5	1	2	6	4	2	5	6	4	2	1	2	1	79	-	-	-	-	-	-	79
Surface:																									
Machinery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	-	4	4
Rolling material	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	1
Electricity	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	2	2
Total surface	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2	2	1	1	7	7
Total underground and surface	27	3	2	6	5	1	2	6	4	2	5	6	4	2	1	2	1	79	1	2	2	1	1	7	86

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TABLE 2. - Fatalities, by causes, and percent of total, 1934

Causes	Fatalities	Percentage of total fatalities
Underground:		
Falls of roof, ribs, and face coal	47	54.66
Caught between cars	2	2.33
Run over by cars or locomotives	3	3.48
Fell off front end of cars	5	5.82
Runaway cars	5	5.82
Lack of clearance	3	3.48
Electricity	6	6.97
Machinery	2	2.33
Shots	2	2.33
Handling explosives	1	1.16
Miscellaneous	3	3.48
Surface:		
Machinery	4	4.65
Rolling material	1	1.16
Electricity	2	2.33
Total	86	100.00

TABLE 3. - Fatalities, by occupations, and percent of total, 1934

Occupation	Fatalities	Percentage of total fatalities
Underground:		
Hand loaders	27	31.40
Loading-machine operators	3	3.48
Loading-machine helpers	2	2.33
Conveyor loaders	6	6.97
Cutting-machine operators	5	5.82
Cutting-machine helpers	1	1.16
Drillers and snubbers	2	2.33
Timbermen	6	6.97
Track layers	4	4.65
Motormen	2	2.33
Trip riders	5	5.82
Drivers	6	6.97
Pumpmen	4	4.65
Electricians	2	2.33
Company men	1	1.16
Foremen	2	2.33
Shot firers	1	1.16
Surface:		
Oilers	1	1.16
Laborers	2	2.33
Blacksmiths	2	2.33
Engineers	1	1.16
Miners	1	1.16
Total	86	100.00

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TABLE 4. - Fatalities, by causes and occupations, 1935

Causes	Occupation: Underground: Hand loaders	Loading-machine operators	Loading-machine helpers	Conveyor loaders	Cutting-machine operators	Cutting-machine helpers	Timbermen	Track layers	Motormen	Trip riders	Drivers	Trappers	Shot firers	Repairmen	Company men	Examiners	Foremen	Total underground	Surface: Laborers	Oilers	Shot firers	Total surface	Total surface and underground
Underground:																							
Falls roof, face, and rib	20	2	1	1	2	1	2	1	3	-	-	-	-	-	1	1	1	36	-	-	-	-	36
Caught between cars	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	1
Run over by cars or motors	-	-	-	-	-	-	-	-	1	3	-	-	-	1	1	1	-	7	-	-	-	-	7
Fell off front end of cars	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	4	-	-	-	-	4
Lack of clearance	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	2	-	-	-	-	2
Flying switches	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	1
Derailment of cars or motors	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	1
Electricity	-	-	-	-	-	-	-	-	2	-	1	-	-	-	1	-	-	4	-	-	-	-	4
Machinery	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
Shots	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	2	-	-	-	-	2
Explosions	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	1
Falling down shaft	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	2
Lifting	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
Miscellaneous	4	-	-	2	-	-	1	1	-	1	3	-	-	-	-	-	-	12	-	-	-	-	12
Total underground	26	2	1	3	2	2	4	3	7	5	9	1	3	1	3	2	1	75	-	-	-	-	75
Surface:																							
Railroad cars	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	1	1
Falling persons	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	2	2
Machinery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	1
Shots	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	1
Falling down shaft	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	1
Miscellaneous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	1
Total surface	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	2	-	7	7
Total underground and surface	26	2	1	3	2	2	4	3	7	5	9	1	3	1	3	2	1	75	5	2	-	7	82

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TABLE 5. - Fatalities, by causes, and percent of total, 1935

Cause	Fatalities	Percentage of total fatalities
Underground:		
Falls of roof, rib, and face coal	36	43.91
Caught between cars	1	1.22
Run over by locomotives or cars	7	8.54
Fell off front end of cars	4	4.87
Lack of clearance	2	2.44
Flying switches	1	1.22
Derailment of cars or locomotives	1	1.22
Electricity	4	4.87
Machinery	1	1.22
Shots	2	2.44
Explosives	1	1.22
Falling down shaft	2	2.44
Lifting	1	1.22
Miscellaneous	12	14.63
Surface:		
Railroad cars	1	1.22
Falling persons	2	2.44
Machinery	1	1.22
Shots	1	1.22
Falling down shaft	1	1.22
Miscellaneous	1	1.22
Total	82	100.00

TABLE 6. - Fatalities, by occupations, and percent of total, 1935

Occupations	Fatalities	Percentage of total fatalities
Underground:		
Hand loaders	26	31.71
Loading-machine operators	2	2.44
Loading-machine helpers	1	1.22
Conveyor loaders	3	3.66
Cutting-machine operators	2	2.44
Cutting-machine helpers	2	2.44
Timbermen	4	4.87
Track layers	3	3.66
Motormen	7	8.54
Trip riders	5	6.09
Drivers	9	10.98
Trappers	1	1.22
Shot firers	3	3.66
Repairmen	1	1.22
Company men	3	3.66
Examiners	2	2.44
Foremen	1	1.22
Surface:		
Laborers	5	6.09
Oilers	2	2.44
Total	82	100.00

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TABLE 7. - Fatalities by cause and occupation, 1939

Causes	Occupation: Underground: Hand loaders	Loading-machine operators	Loading-machine helpers	Conveyor loaders	Cutting-machine operators	Timbermen	Track layers	Motormen	Trip riders	Drivers	Drillers	Pumpmen	Electricians	Trappers	Shot firers	Examiners	Repairmen	Company men	Foremen	Total underground	Surface: Laborers	Shovel operators	Total surface	Total surface and underground
Underground:																								
Falls roof, rib, and face coal	28	2	7	2	2	4	2	1	2	1	1	-	1	-	-	-	-	1	3	56	-	-	-	56
Coupling cars	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	2	-	-	-	2
Run over by cars or motors	-	-	-	-	-	-	2	-	-	1	-	-	-	-	1	-	1	1	-	6	-	-	-	6
Runaway cars	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	2	-	-	-	2
Lack of clearance	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	2	-	-	-	2
Electricity	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1
Machinery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	1
Shots	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	1
Mine fires	-	1	-	-	1	-	-	1	-	-	1	1	-	-	-	1	-	-	3	9	-	-	-	9
Handling explosives	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1
Poor ventilation	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	2
Miscellaneous	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-	3	-	-	-	3
Total underground	32	3	7	2	4	4	4	2	4	4	3	1	1	1	2	1	1	3	7	86	-	-	-	86
Surface:																								
Railroad cars	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	3	3
Falling persons	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1
Machinery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	1
Rolling rock	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	1
Miscellaneous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1
Total surface	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	1	7	7
Total surface and underground	32	3	7	2	4	4	4	2	4	4	3	1	1	1	2	1	1	3	7	86	6	1	7	93

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TABLE 8. - Fatalities, by causes and percent of total, 1936

Cause	Fatalities	Percentage of total fatalities
Underground:		
Falls of roof, rib, and face coal	56	60.22
Coupling cars	2	2.16
Run over by locomotives or cars	6	6.45
Runaway cars	2	2.16
Lack of clearance	2	2.16
Electricity	1	1.07
Machinery	1	1.07
Shots	1	1.07
Mine fires	9	9.67
Handling explosives	1	1.07
Poor ventilation	2	2.16
Miscellaneous	3	3.23
Surface:		
Railroad cars	3	3.23
Falling persons	1	1.07
Machinery	1	1.07
Rolling rock	1	1.07
Miscellaneous	1	1.07
Total	93	100.00

TABLE 9. - Fatalities, by occupations and percent of total, 1936

Occupations	Fatalities	Percentage of total fatalities
Underground:		
Hand loaders	32	34.40
Loading-machine operators	3	3.23
Loading-machine helpers	7	7.53
Conveyor loaders	2	2.16
Cutting-machine operators	4	4.30
Timbermen	4	4.30
Tracklayers	4	4.30
Motormen	2	2.16
Trip riders	4	4.30
Drivers	4	4.30
Drillers	3	3.23
Pumpmen	1	1.07
Electricians	1	1.07
Trappers	1	1.07
Shot firers	2	2.16
Examiners	1	1.07
Repairmen	1	1.07
Company men	3	3.23
Foremen	7	7.53
Surface:		
Laborers	6	6.45
Shovel operators	1	1.07
Total	93	100.00

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TABLE 10. - Summary of fatalities, by causes and occupations, 1934-36

Causes	Occupation: Underground: Hand loaders	Loading-machine operators	Loading-machine helpers	Conveyor loaders	Cutting-machine operators	Cutting-machine helpers	Timbermen	Track layers	Motormen	Trip riders	Drivers	Trappers	Drillers	Snubbers and drillers	Repairmen	Pumpmen	Electricians	Shot firers	Examiners	Company men	Foremen	Total underground	Surface: Laborers	Oilers	Shovel operators	Blacksmiths	Engineers	Miners	Total surface	Total surface and underground
Underground:																														
Falls roof, rib, and face coal	67	7	10	7	7	2	11	5	6	3	1	1	1	1	-	3	1	-	1	2	4	139	-	-	-	-	-	-	-	139
Caught between cars	1	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	1	3	-	-	-	-	-	-	-	3
Coupling cars	1	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	2
Run over by cars or motors	1	-	-	-	-	-	-	3	1	3	1	-	-	-	2	1	-	1	1	2	-	16	-	-	-	-	-	-	-	16
Lack clearance	1	-	-	-	-	-	-	1	-	1	2	1	-	-	-	-	-	-	-	1	1	7	-	-	-	-	-	-	-	7
Flying switches	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1
Runaway cars	3	-	-	1	-	-	-	-	-	1	-	-	1	-	-	-	1	-	-	-	-	7	-	-	-	-	-	-	-	7
Derailment of cars or motors	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1
Fell off front end cars or motors	2	-	-	-	-	-	-	1	2	1	-	-	1	-	-	-	1	-	-	1	-	11	-	-	-	-	-	-	-	11
Electricity	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1
Machinery	-	-	-	-	2	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	4	-	-	-	-	-	-	-	4
Shots	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	5
Mine fires	-	1	-	-	1	-	-	-	1	-	1	-	-	-	-	1	-	1	1	-	3	9	-	-	-	-	-	-	-	9
Explosions	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	2
Handling explosives	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	2
Falling down shaft	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	2
Poor ventilation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*	-	-	-	-	-	-	-	*
Lifting	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	2	-	-	-	-	-	-	-	2
Miscellaneous	6	-	-	2	-	-	2	1	-	2	4	-	-	-	-	-	-	-	-	-	1	18	-	-	-	-	-	-	-	18
Total underground	85	8	10	11	11	3	14	11	11	12	19	4	3	2	2	5	3	6	3	7	10	240	-	-	-	-	-	-	-	240
Surface:																														
Railroad cars	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	4	4
Machinery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	1	-	-	-	2	6	6
Falling persons	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	-	-	3	3
Falling down shaft	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	1
Shots	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	2	2
Rolling material	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	1	-	-	3	3
Electricity	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	1
Miscellaneous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	2	4	4
Total surface	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	3	1	2	1	7	21	21
Total surface and underground	85	8	10	11	11	3	14	11	11	12	19	4	3	2	2	5	3	6	3	7	10	240	13	3	1	2	1	7	21	261

* Included in total fatalities underground this table.

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TABLE 11. - Summary of fatalities, by causes and percent of total, 1934-36

Cause	Fatalities	Percent of total fatalities
Underground:		
Falls of roof, rib, and face coal	139	53.26
Caught between cars	3	1.19
Coupling cars	2	.77
Run over by cars or locomotives	16	6.13
Lack of clearance	7	2.68
Flying switches	1	.38
Runaway cars	7	2.68
Derailments of locomotives or cars	1	.38
Fell off front end of locomotives or cars	9	3.45
Electricity	11	4.22
Machinery	4	1.54
Shots	5	1.92
Mine fires	9	3.45
Explosions	1	.38
Handling explosives	2	.77
Falling down shaft	2	.77
Poor ventilation	2	.77
Lifting	1	.38
Miscellaneous	18	6.90
Surface:		
Railroad cars	4	1.54
Machinery	6	2.26
Falling persons	3	1.15
Falling down shaft	1	.38
Shots	1	.38
Rolling material	2	.77
Electricity	2	.77
Miscellaneous	2	.77
Total	261	100.00

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TABLE 12. - Summary of fatalities, by occupations and percent of total, 1934-36

Occupation	Fatalities	Percentage of total fatalities
Underground:		
Hand loaders	85	32.57
Loading-machine operators	8	3.07
Loading-machine helpers	10	3.84
Conveyor loaders	11	4.22
Cutting-machine operators	11	4.22
Cutting-machine helpers	3	1.15
Timbermen	14	5.37
Track layers	11	4.22
Motormen	11	4.22
Trip riders	12	4.59
Drivers	19	7.26
Trappers	4	1.54
Drillers	3	1.15
Shubbers and drillers	2	.77
Repairmen	2	.77
Pumpmen	5	1.92
Electricians	3	1.15
Shot firers	6	2.26
Examiners	3	1.15
Company men	7	2.68
Foremen	10	3.84
Surface:		
Laborers	13	4.98
Oilers	3	1.15
Shovel operators	1	.38
Blacksmiths	2	.77
Engineers	1	.38
Miners	1	.38
Total	261	100.00

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Underground Fatalities

Falls of Roof, Face, and Sides

During the period 1882 to 1933, inclusive, 6,188 men were killed underground, according to the records of the Illinois Department of Mines; of this number, 3,161 (51 percent) were killed by falls of roof, face, or sides.

During the 3-year period 1934-36, 238 men were killed underground, 139 (58.4 percent) of whom were killed by falls of roof, face, or sides (see table 10). These figures indicate that the record for accidents from this cause was not as good during 1934-36 as it was during 1882 to 1933.

Of those killed by falls of roof, sides, or face, hand loaders rank first with 67 (48.2 percent) of the fatalities from this cause, timbermen rank second with 11 (7.9 percent), loading-machine helpers are third with 10 (7.1 percent), and loading-machine operators, conveyor loaders, and cutting-machine operators fourth with 7 each (5 percent).

Of the total number killed thus (139) during the 3-year period, 121 were killed by falling roof, 17 by falling face coal, and 1 by falling rib coal. Of the 121 killed by falling roof, 95 (78.5 percent) were killed at the face, 22 (18.1 percent) on the entry, and 4 (3.3 percent) on room roadways. According to the reports, in 39 (32.3 percent) of the fatalities from falls of roof, the roof was thought to have been solid or perfectly safe a short time before it fell; in some instances, men knew the roof was dangerous but tried to load a car or do other work before setting props or pulling down the loose rock or coal.

Depending solely upon judgment as to whether roof is solid or absolutely safe and failing to set props under loose roof before doing other work are unsafe practices, and unless they are prohibited they will continue to be responsible for the killing and injuring of men in the future as they have in the past. Judgment must be relied on to a certain extent, but the fact that 32.3 percent of the fatalities caused by roof falls occurred in places considered solid or absolutely safe is evidence that judgment alone is not enough and that it would be better practice to set props as the coal is loaded out, where the roof is apparently good, and where it is bad it should be either timbered or taken down before other work is done.

There are so many variable, invisible factors affecting roof control, that roof that sounds solid and appears to be safe may not remain solid or safe for an indefinite period; therefore, roof should be tested at regular intervals and systematically timbered. Where roof is good, the centers on which props should be set, the clearance along roadways, and the distance the prop line should be maintained from the face should be specified; and where the roof is bad, additional props or crossbars should be set to make the place safe. Safety props also should be used as an additional accident-prevention measure until the regular prop line can be advanced according to the standard.

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Roof should be sounded and timbered systematically, whether loading is mechanical or done by hand. In the past, the tendency has been to neglect timbering in some mines where loading is done machanically, with the result that the prop line in some places has been 20 to 40 feet from the face; this is not good practice and has caused many injuries. With mechanical loading, several men often are working at the face, and if the props are not maintained as near as possible to the face there is considerable chance of killing several men at one time. In 1935 and 1936 there were three accidents in which two men were killed at one time by roof falls. In another instance a man was injured severely and it was thought for some time that he would not recover. In still another instance, fortunately only two were killed instead of four. These fatalities occurred in places that were considered safe a short time before the roof fell.

Roof falls were responsible for 22 fatalities on entries and 4 on room roadways - a total of 26 (21.4 percent of the total from this cause, 121). Of the number killed on entry roadways, 6 were motormen, 3 were trip riders, and 1 was a driver - a total of 10 haulagemen (45.4 percent).

Good haulagemen are an asset to any mine and, in addition to the compensation, the loss otherwise to a mine organization is considerable when so many haulagemen are killed. Therefore, it would be good practice to make haulageways at least relatively safe.

The writer has been told many times by foremen that they seldom, if ever, examine the roof on roadways unless a piece of roof becomes bad enough to attract their attention. If true, this explains why there are so many fatalities on roadways, and it is surprising that there are not more. Some companies have adopted the practice of testing roof on haulageways at regular intervals; if the roof is bad, it is either taken down or timbered as soon as possible. The result is that injuries from roof falls along these roadways virtually have been eliminated and the haulage systems have become more efficient.

Eleven timbermen were killed by roof falls, some of them on roadways. In some instances, timbermen failed to set safety props before attempting to timber bad roof or replace broken crossbars. The work of timbermen is more or less hazardous at all times and undoubtedly in many instances they become careless; therefore, they should be required to take every precaution and set safety props while timbering bad roof or replacing crossbars. Irrespective of having had years of experience, timbermen should be supervised closely.

Falls of face coal were responsible for 17 fatalities and falls of rib for 1 fatality, a total of 18, or 12.9 percent of the total number killed by falls of roof, face, or rib. The reports on some of these fatalities stated that the face sounded solid a short time before it fell. However, solid face coal is similar to solid roof and should be watched at all times as there may be invisible slips or powder cracks in the face that might cause it to fall while it is being undercut or while other men are working at or near the face. Faces of all rooms should be spragged while being undercut and the sprags allowed to remain in place until just before the face is blasted, so that all

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those working in and around the face will be protected. There are companies in Illinois that have adopted systematic spragging of faces while the place is being undercut, sprags being placed at 6-foot intervals. Since this practice was adopted, serious injuries from falling face coal have been experienced infrequently, and the practice has curtailed production very little if at all.

Four fatal accidents occurred while the victims were undermining standing face coal, an unsafe practice that prevails in some mines where hand and conveyor loading is used. It has killed many men in the past and will continue to kill them as long as it is practiced. Coal should be taken down from the top.

The high accident rate from falls of roof, face, and sides that has prevailed in Illinois mines for 55 years might indicate that the problem is too difficult to be solved; however, it can be solved and the accident rate from this cause reduced at least 75 percent if the management of all mines in the State will adopt practices similar to those that have produced results in other mines and that have been discussed in this and numerous other publications of the Bureau of Mines.

Haulage

Table 10 shows that during 1934-36, 46 (19.3 percent) of the total underground fatalities were caused by haulage. The causes and number of these fatalities were: Run over by cars or locomotives, 16 (34.7 percent); falling off the front end of cars or locomotives, 9 (19.5 percent); lack of clearance and runaway cars, 7 each (15.1 percent); and caught between cars, 3 (6.5 percent). When ranked according to occupation, drivers are first with 13 (26 percent) of the haulage fatalities, trip riders second with 7 (15.1 percent), hand loaders and tracklayers third with 4 each (8.7 percent), and motormen, repairmen, and foremen fourth with 2 each (4.3 percent).

Of the 16 fatalities resulting from being run over by cars or locomotives, three were trip riders, two of whom were running ahead of the locomotives, and the other tried to get onto a moving locomotive and missed the step. In four other instances employees, other than haulage crews, who were permitted to ride on locomotives fell off and were run over. In two of these cases the deceased men were riding on a locomotive instead of in a car in the man-trip. Three trackmen, two repairmen, and one company man were run over while working on haulageways.

Running ahead of and getting on and off moving locomotives are unsafe practices and have been prohibited by some companies in Illinois as well as in other coal-mining States. Permitting men other than haulage crews to ride on locomotives, particularly at the end of a shift, has caused many serious and fatal injuries. If at any time more men than the haulage crews are to be transported to the shaft bottom at the end of the shift, cars should be attached to the locomotive for this purpose and the trip operated as a man-trip. When employees other than haulage crews are required to perform haulage work, they should be very careful about moving trips.

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Falling off the front end of cars was responsible for 9 fatalities; 8 victims were drivers, and the other was a trip rider. While both management and drivers may criticize the suggestion that drivers be required to ride the rear end of trips, some companies have adopted this practice without curtailing production and with material aid to safety. In many mines, locomotive trips are pushed long distances with the trip rider riding the front end, a decidedly dangerous practice; in some mines this has been eliminated by rearranging partings or installing crossover switches in cross and panel entries.

Table 10 shows that seven fatalities were caused by lack of clearance. Six different classes of labor were involved in these fatalities, which shows that lack of clearance may be a hazard to any class of labor that may be working or traveling on the haulage road.

Too little attention is given to maintaining sufficient clearance along the haulageways. In many instances entries are crooked, and very little consideration is given to clearance if the track can be laid and the cars and locomotives can operate. Often materials such as props, rails, ties, gob, etc., are thrown along the track, so clearance is eliminated. In mines with entries at least 12 feet wide and comparatively straight, with the sides of the entries kept free of gob material, and with supplies placed along entries as they should be, enough clearance can and should be maintained along both sides of the track to eliminate accidents due to this cause.

Seven fatalities were caused by runaway cars, some of which were due to poorly blocked cars on grades and some to cars being shunted into room necks, after which they ran to the face of the room. Blocking cars securely on grades has not been given enough consideration; many workers use cap pieces, small pieces of wood, fine coal, or anything that may be handy at the time, and such practices have resulted in many fatalities, particularly where cars were poorly blocked in rooms and entries on a grade. Under such conditions, a good substantial block should be used, such as the notched tie, a prop set on an angle with the ends anchored in the roof and floor, or blocks that clamp onto the rail; it would be an additional safety measure if sprags also were placed in the wheels of the car. When men are cutting, drilling, timbering, or laying track in rooms in which coal is not being loaded, it is good practice to block the switch for the straight entry and also to place a safety block on the room roadway so that cars cannot be pushed to the face of the room.

Derailment of cars was responsible for one of the haulage fatalities, caught between cars for three, coupling cars for two, and flying switches for one. Mine management now is inclined to give greater consideration to track and rolling stock, and unquestionably this is responsible for a decrease in fatalities due to derailments. Two of those killed by being caught between cars were trip riders; the trip had come out of a room with loads that were placed inby the room neck, and the trip riders supposedly kicked the latch for the locomotive trip to return to the room and went to couple the loaded cars on the entry; but instead of the trips going into the rooms, they went along the straight track and caught the trip riders between the empty and loaded cars. Doubtless, throws on the room switches would have prevented these fatalities.

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Coupling cars on the "fly" is a practice that has resulted in the killing or injuring of many haulagemen in the past; however, many of the coal companies prohibit this practice, as they have found that it is not only hazardous but very inefficient.

Like railroads, haulage systems of coal mines will respond to safer practices. By adopting new operating ideas and safer practices, the railroads have greatly reduced the rate of accidents to both passengers and employees and in so doing have increased efficiency as well as decreased not only costs but accident occurrence as well. The unsafe practices permitted on the haulage systems in coal mines are unnecessary and can be eliminated without curtailing production or cost of operation.

Electricity

Eleven fatalities were caused by electricity, most of them through contact with unguarded trolley wires. In recent years, unguarded power lines and other electrical equipment have been among the major causes of fatalities in coal mines and, as the use of electrical equipment is increasing, it is reasonable to assume that the fatality rate will increase unless additional precautions are taken in the future.

Table 10 shows that 9 different classes of labor were involved in the 11 fatalities caused by electricity, and doubtless all other classes not affected were exposed more or less to the hazard in some way. The Mine Safety Board of the Bureau of Mines recommends that trolley and other bare electrical wires be adequately guarded at all places along their length where they are less than 6 1/2 feet above the rail. Stationary electrical equipment, such as motor-generator sets, switchboards, etc., should be grounded and protected in every way known to be effective in preventing accidents to workers. Repairing electrical equipment with the power on is an unsafe practice followed by some workmen and allowed by some operating companies. It is good practice to consider all wires "hot" until it is definitely known that no current is passing through them; and common sense as well as experience should make it evident that contact with so-called "low-voltage-current" wires may be dangerous, at least under some circumstances. Good practice demands that electrical equipment be inspected regularly and that only qualified workmen be permitted to repair such equipment. The electrical hazard would be reduced materially and efficiency of equipment increased if cables were inspected frequently and splices made properly.

Machinery

Machinery was responsible for four (1.6 percent) of the total underground fatalities; of these, two were cutting-machine operators, one was a cutting-machine helper, and one a foreman. The two cutting-machine operators were killed while using power to move the machine - a dangerous practice that should be prohibited in all mines. The cutting-machine helper was caught in the bits of the machine; guards on the cutter bars of this machine

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might have prevented the accident. Cutting-machine men should be careful at all times while the machine is in operation. The foreman was killed while inspecting machinery, when for some reason the power was turned on; when machinery is being repaired or inspected it should be stopped, and it should be understood definitely who should turn on the power. While machinery is responsible for a small percentage of the accidents as a whole, yet when an accident does occur it usually is serious or fatal; therefore, the moving parts of all machinery around which employees are required to work should be well-guarded and machinery should not be repaired while in motion.

Shot Firing

Four shot firers and one snubber and driller were killed by shots. Some of the common causes of accidents of this kind are the failure of shot firers to get a safe distance from the shots, going back to the face before shots have exploded, shots blowing through the rib from one place to another, and drilling out misfires. Shot firers should always retire to a safe distance from the shot. When squibs or fuse are used, there is always the possibility of a hangfire, and in some instances men return to the face too soon and often arrive there as the shot explodes. Many serious and fatal accidents have been caused by drilling out misfires; if a misfire occurs, another hole should be drilled not less than a foot from the misfire. The Mine Safety Board of the Bureau of Mines recommends that a permissible electrical apparatus be used for shooting shots in coal mines and that shots be fired one at a time. A Bureau of Mines engineer tabulated the accidents after 161,256,565 shots had been fired, and found that the rate of accident occurrence was lower where shots had been fired electrically than where squibs and fuse were used.

Mine Fires and Explosions

Mine fires and explosions are potentially the most dangerous of all mine accidents and usually cause the greatest loss of life and destruction of property at one time. Some of the most common causes of fires and explosions are poor ventilation, use of nonpermissible electrical equipment, use of black powder, coal dust, faulty electrical installations, smoking, open lights, and spontaneous combustion.

During the 3 years covered by this report, 9 lives were lost owing to a mine fire. The cause of the fire was not determined definitely, but it is believed to have been of electrical origin. Those killed were overcome by irrespirable gases while traveling on a haulage road on the return side of the fire. Those fighting a fire or doing recovery work after explosions should wear respiratory apparatus, especially if working or traveling in air containing the gases from the face or explosion; they certainly cannot withstand the irrespirable gases usually found in return air from regions in which fires or explosions have occurred.

Maintenance of fire stations in each section of the mine would reduce the fire hazard, as many fires can be extinguished in their incipiency if fire-fighting equipment is available when the fire is first discovered.

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One shot firer was killed by an explosion due to a shot charged with black powder; as long as coal is blasted with black powder, explosions of this kind can be expected. In addition to using black powder, fine coal is frequently utilized for stemming, which greatly increases the hazard. The Mine Safety Board of the Bureau of Mines recommends that for blasting coal or rock in coal mines, permissible explosives or equivalent permissible device be used exclusively and that each charge be in a hole properly drilled and stemmed with incombustible material.

Handling Explosives

Two hand loaders were killed while handling explosives. In one case the victim was smoking while preparing black powder for his shots and a keg of powder was ignited; in the other, the victim was placing a charge of black powder in a shot hole when the charge exploded. When some of the unsafe practices followed around coal mines in handling explosives are considered, it is surprising that there are not more fatalities from this cause. The use of open lights or smoking by men while handling explosives and, more especially, when handling any kind of black blasting powder indicates extreme carelessness and disregard for their own lives as well as the lives and property of others. The hazards in handling permissible explosives are not nearly as great as in handling black blasting powder; it would be much safer, therefore, if permissible explosives were used in all coal mines, and if black blasting powder in all of its forms were excluded from coal mines.

Smoking and open lights should not be permitted in any coal mine at any time and certainly not when explosives are being used. Greater care should be used in charging holes; when a charge of powder becomes lodged in a hole, some miners use an iron bar to jam the charge past the obstruction. More attention should be given to keeping the bits of augers large enough so the charge of powder will not lodge in the hole. The diameter of cartridges in which black powder is placed should be smaller than the diameter of the shot hole. Only wooden tamping bars should be used for charging and tamping shot holes. In some mines large quantities of explosives are stored at one place, and this is anything but good practice.

Falling Down Shaft

Two hand loaders were killed by falling down a shaft; in each case they were either crowded off or lost their balance while on the cage. There are many cages in the mines of Illinois as well as other States that do not provide protective devices to prevent men from falling off the cage, and frequently too many are permitted to ride on the cage at one time. All mine cages on which men are hoisted or lowered should be protected in some way on the sides and ends, including the entrance, so that men cannot fall off. When men are doing repair work in a shaft where it is necessary to use scaffolding, the lumber should be examined closely and tested before it is used, and under no circumstances should anything less than 3-inch plank be used; the hazard of working in shafts would be reduced materially if life belts were worn.

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Poor Ventilation

Two hand loaders were overcome by "black damp" when they went into a small mine to prepare coal. The fan had not been operating at the mine for some time, and although the owners instructed the victims not to go in, they disregarded the instructions. A number of workers and owners have been killed by black damp in the small mines of Illinois and other States. Mines, particularly those that are not ventilated regularly, should not be entered before they have been examined with a flame safety lamp. If the flame of the lamp is extinguished, the examiners should return to fresh air and stay out until the section, or mine as a whole, has been ventilated. From the information that has been disseminated on this subject it would appear that all those engaged in mining, particularly those in an official capacity, would know that it is impossible to sustain life without oxygen and that an atmosphere in which a flame safety lamp will not burn should be considered dangerous. However, judging by the number, including mine officials, that have been killed by black damp relatively recently in mines in the United States, more educational work seems to be necessary regarding the hazard of a low-oxygen mine atmosphere.

The most economical factor in mining in small or large mines is good ventilation. Although certain costs are connected with a good ventilating system, such as the provision of a suitable fan for the mine, good clean aircourses, and tight doors and stoppings, yet it costs more to attempt to maintain a poor ventilating system. The principal benefits to be derived from good ventilation are increased efficiency of both workers and animals, better satisfaction on the part of the workers, and the elimination of the gas hazard both as to explosives and as to asphyxiations.

One timberman was killed as a result of lifting; much lifting by timbermen, particularly where heavy crossbars are being set, can be avoided if timber jacks are used. In lifting, many workers keep their knees rigid and throw all the strain on the back and trunk, which is poor practice; the worker should bend his knees and, as he lifts, straighten at the knees, which prevents all of the strain from being thrown on the upper part of the body.

Miscellaneous

There were 18 accidents due to miscellaneous causes - that is, accidents not included in the regular classifications and somewhat out of the ordinary. To prevent miscellaneous accidents, both employer and employees must observe existing hazards more closely and take the necessary precautions after learning what has caused previous accidents.

Four of the fatalities of a miscellaneous nature were due to blood poisoning; one victim scratched his hand with a wire and another ran a splinter in his finger. Many employees consider small scratches and cuts unimportant and pay little attention to them until infection has developed, when it is sometimes too late to prevent serious results, even death. All cuts and scratches should be given at least first-aid treatment, and it

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would be better if a physician were consulted as soon as possible; if this procedure were followed, fatalities from blood poisoning could be practically eliminated. One fatality was caused by erysipelas and one by gangrene. Five of the fatalities under miscellaneous causes were of questionable origin, that is, the reports stated that it was not known whether death was due to an injury or other causes as no witnesses were present; however, they are recorded as mine fatalities.

Surface Fatalities

During the 3 years covered by this report, 21 fatalities occurred on the surface. Of this number, machinery as a cause ranks first with 6 (28.5 percent); railroad cars second with 4 (19 percent); falling persons third with 3 (14.2 percent); and rolling material, electricity, and miscellaneous fourth with 2 each (9.5 percent).

Machinery

The prevention of accidents by machinery on the surface of a mine is similar to prevention underground or in an industrial plant. Care should be exercised while working around moving machinery, repairs should not be made while machinery is in operation, and the moving parts should be well-guarded.

Railroad Cars

During the 3 years four men were killed by railroad cars. From 1882-1936, inclusive, railroad cars rank first as a cause of fatalities on the surface, with 113 (48.2 percent). Very little information was given in the reports regarding the actual cause of these accidents; some of the principal causes of fatalities due to railroad cars are loose or defective grab irons and defective brakes and chains, which should be inspected regularly. Many tipples and buildings adjacent to railroad tracks are constructed with little if any thought to clearance, and in some instances no effort is made to remedy the hazard in conditions of this nature unless an employee is seriously injured or killed. Poorly blocked cars have caused many injuries around tipples; some companies have installed machanical car droppers that eliminate wooden blocks and the necessity for tipple employees to be near a car while it is moved. At some mines considerable debris strewn around the tipple constitutes a stumbling hazard likely to cause an employee to fall under a moving railroad car. Too much care cannot be used by employees while working around railroad cars at or around coal-mine tipples.

Falling Persons

Three men were killed by falling. Some of the causes of fatalities of this class are from the stumbling hazard, due to unkempt surface grounds; platforms constructed of defective lumber or without guard rails or with guard rails that are defective in construction or in poor repair; ladders with defective rungs or sides or set at such an angle and on material that

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causes the ladder to slide when in use; scaffolds constructed of defective lumber; and the inability of some men to work above the ground.

There is no reason why grounds around tipples and other structures on the surface at coal mines cannot be maintained in neat and orderly condition. A clean surface with a place for everything and everything in its place not only reduced the hazard but also conserves materials and makes the surface operation more efficient. Lumber that is used for platforms and scaffolds should be inspected carefully for cracks, knots, or other defects. Some industries test all lumber used for this purpose and require that the lumber withstand at least three times the weight that it is expected to bear when in use. Strong, effective guard rails should be placed around temporary or permanent platforms. Ladders that are stored for indefinite periods should be inspected closely before they are used. Some companies use nonskid shoes on the bottoms of ladders to prevent them from slipping. Some men cannot work very high above ground and it is poor practice for such men to work on ladders, platforms, and scaffolds and on top of buildings.

Rolling Material

Two men were killed at strip pits by rolling rock. There is always some danger of rolling rocks or other material on the high walls and spoil banks in strip pits; therefore, employees working in the cut should be cautious at all times when working near the base of the high wall or spoil bank, and utmost effort should be made to keep those high wall and spoil banks free of loose material at points along which men must pass or must work.

Electricity

Two men were killed by electricity on the surface - a blacksmith was electrocuted by a small fan, the housing of which had become grounded, and a miner was electrocuted by grasping a live wire that had become detached from a pole and had fallen to the ground.

Prevention of electrical accidents on the surface of a mine is similar to prevention any place where electricity is used; only qualified men should be permitted to work on electrical equipment, and regular inspection of surface electrical equipment would prevent many accidents. If the fan had been inspected by a qualified workman, the defect that caused the frame to become charged might have been detected and the death of one victim prevented. Whether the wire that caused the miner's death had fallen as the result of a storm or faulty installation was not stated in the report; however, it would be good practice to install electric wires in a workmanlike manner and inspect the surface for fallen wires after storms. It should be borne in mind by all workmen that any wire may be a "live" wire and should be considered as such until it is known that it is not charged.

Falling Down Shaft

A laborer employed on the surface was killed by falling down a shaft. He was attempting to push a car onto the cage, which was not at the surface

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landing; before attempting to push cars onto the cage, employees should know that the cage is at the landing. A good practice is to have blocks on the rails a short distance from the shaft and gates at the ground landing; this would require employees to observe whether the cage is at the landing at the time the blocks are removed from the rails and the gates are opened. Engineers also should be careful about a cage before a car is placed on it.

Fatalities According to Years of Experience

Table 13 shows the number killed and the victims' years of experience at the mines where the fatalities occurred. The years of experience are grouped in 5-year periods.

TABLE 13. - Number killed and years of experience at mines where fatalities occurred, 5-year periods

Experience	Killed, 1934	Killed, 1935	Killed, 1936	Total number killed, 1934-36
1 year, or less, to 5 years.....	36	38	34	108
5 to 10.....	17	23	18	58
10 to 15.....	15	6	19	40
15 to 20.....	5	9	15	29
20 to 25.....	7	5	5	17
25 to 30.....	2	1	2	5
30 to 35.....	2	0	0	2
35 to 40.....	1	0	0	1
40 to 45.....	0	0	0	0
45 to 50.....	0	0	0	0
50 to 55.....	1	0	0	1
Total.....	86	82	93	261

The hours of exposure of the different experience groups could not be obtained, therefore, it was impossible to calculate the frequency rate of each group. Table 13 shows that 108 (or 41.3 percent) of the total number killed had 1 year or less to 5 years experience. Of this number, 51 (46.2 percent) had had 1 year or less experience. The table also shows that 144 (51.3 percent) of the total number killed during the 3-year period had 5 to 25 years experience. This information might indicate that length of service has very little to do with the fatality rate. However, the kind of experience based on safe or unsafe practices has a direct bearing upon the fatality rate. If men are permitted, through poor supervision, to continue unsafe practices they develop into careless workmen and the accident rate will be high regardless of the years of experience.

Fatalities According to Age of Victims

Table 14 shows the number and ages of those killed, grouped in 5-year periods.

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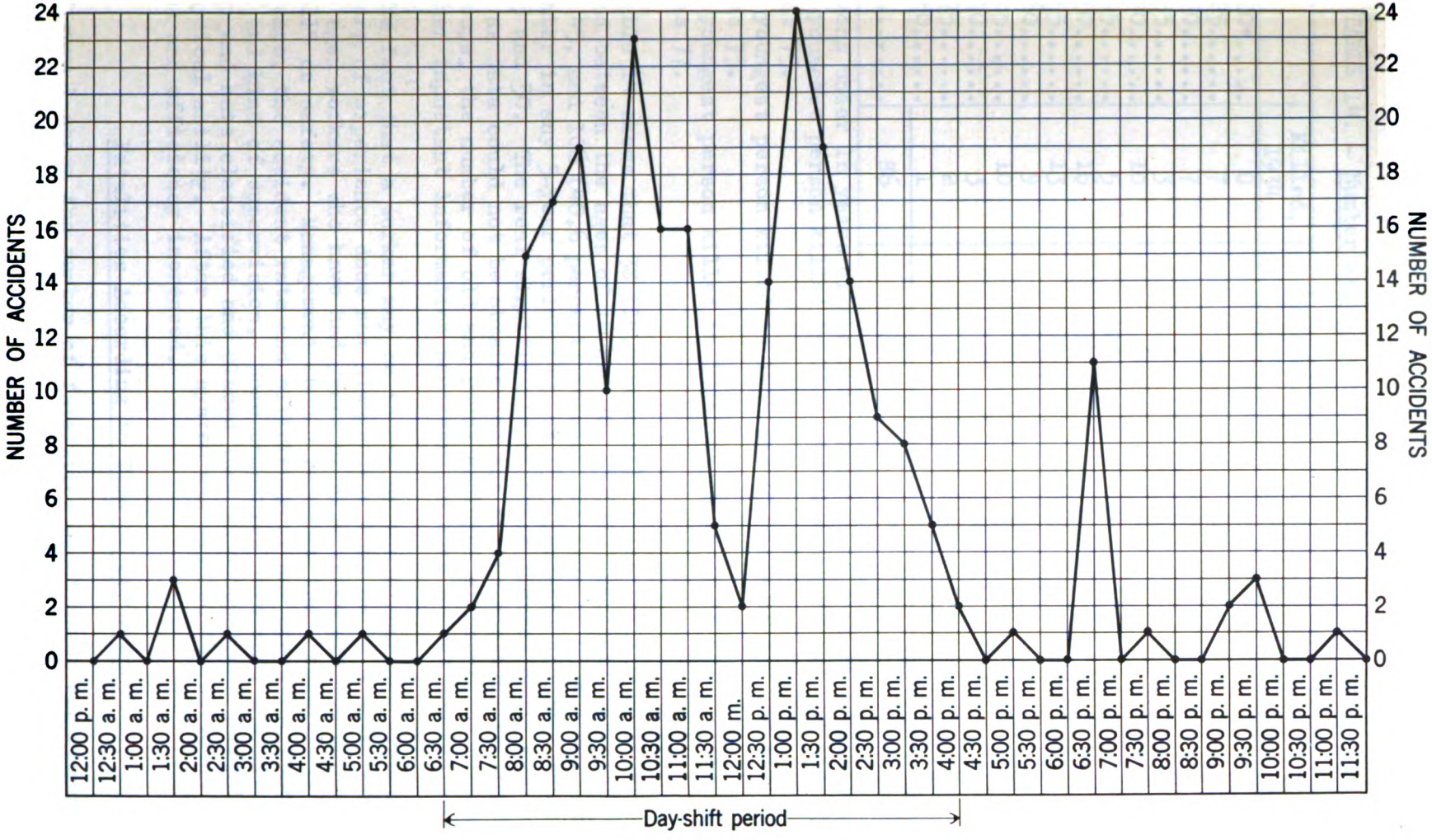

Figure 1.–Time occurrence fatalities, 1934-1935-1936.

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TABLE 14. - Number and ages of those killed, in 5-year periods

Age	Killed, 1934	Killed, 1935	Killed, 1936	Total number killed, 1934-36
16 to 20*.....	0	2	2	4
20 to 25.....	7	4	1	12
25 to 30.....	7	8	7	22
30 to 35.....	3	6	7	16
35 to 40.....	10	6	14	30
40 to 45.....	5	10	14	29
45 to 50.....	16	14	10	40
50 to 55.....	13	11	13	37
55 to 60.....	9	10	10	29
60 to 65.....	10	5	9	24
65 to 70.....	3	4	4	11
70 to 75.....	2	1	1	4
75 to 80.....	1	1	1	3
Total.....	86	82	93	261

* Persons under 16 years of age not permitted to work in Illinois mines.
The youngest person killed in 1934 was 21 years of age and the oldest was 75.
The youngest person killed in 1935 was 19 years of age and the oldest was 75.
The youngest person killed in 1936 was 18 years of age and the oldest was 77.

Table 14 shows that 38 (14.5 percent) of the total number of fatalities occurred between the ages of 16 and 30, 75 (28.7 percent) between the ages 30 and 45, and 106 (40.6 percent) between the ages of 45 and 60. The highest number in any 5-year period (40, or 15.3 percent) occurred between the ages 45 and 50. The real significance of these figures could not be determined, as data could not be obtained on the number employed in the different age groups, the number of old and young employed at hazardous occupations, and other important information necessary to make a just comparison.

The fact that a worker may be in one of the higher age groups and has had years of experience does not always mean that he is a safe worker. Some of the aged workers who have had years of experience are the most difficult to "sell" on safety. Management should remember that, regardless of age and experience, the accident rate and efficiency of any operation depends on the amount and kind of supervision. Some companies have made a study of their workmen and have classified and placed them in occupations according to age and physical ability. After this system was adopted the accident rate was reduced and efficiency increased.

Fatalities According to Time of Occurrence

Figure 1 shows the number of fatalities and time of occurrence based on one-half hour periods.

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Figure 1 shows that 140 (53.6 percent) of the fatal accidents occurred in the morning period from 12 midnight to 12 noon, and 121 (46.3 percent) in the afternoon from 12 noon to 12 midnight.

The peak in the morning period was reached at 10:30 a.m., when 23 (8.8 percent) of the total number of fatal accidents occurred. The 2-hour periods, 8 to 10 a.m. and 9 to 11 a.m., each had 84 (32.4 percent) of the total number of fatalities. The peak hour in the morning was between 8 and 9 a.m., when 51 (19.5 percent) of the fatal accidents occurred.

The peak in the afternoon shift was reached at 1 p.m., when 24 (approximately 9.2 percent) of the fatalities occurred. In the 2-hour period, 12:30 to 2:30 p.m., inclusive, 80 (30.6 percent) of the total number of fatalities occurred. The peak hour in the afternoon period was from 12:30 to 1:30 p.m., when 57 (21.4 percent) of the total number of fatalities occurred.

Some are of the opinion that the greatest number of fatalities occur near the end of the shift and are due, more or less, to fatigue. Apparently this was not true during 1934, 1935, and 1936, as the greatest number of fatalities occurred about the middle of the morning and afternoon of the day-shift period. If a study was made to determine the reason why the majority of the fatal accidents occurred at this time, the hazards might be removed and the fatality rate reduced thereby.

The statement has been made repeatedly that the "speed-up" system in mechanical loading is responsible for the high accident rate in Illinois mines. This may be true in some but not in all mines. The hours of exposure may be greater in hand loading in the production of a certain tonnage, but the hazards are greater with mechanical loading and it would be somewhat difficult, therefore, to make a just comparison of their accident rates. However, in 1933, 38.7 percent of the total tonnage of the State was produced by hand loading; in 1936, 33.3 percent was produced by hand loading, a reduction of 5.4 percent compared with 1933. Mechanical loading in shaft mines has increased from 30 mines loading 17,766,216 tons in 1933 to 51 mines loading 25,205,170 tons in 1936.

The production of strip mines has increased from 5,599,006 tons in 1933 to 8,873,229 in 1936. This decrease in hand loading and increase in mechanical loading means a corresponding decrease and increase in the number employed.

It is logical to assume that the decrease in hand loading would reduce the hours of exposure and thereby cause a decrease in the number of hand loaders killed, but such is not the case. In 1933, 28.1 percent of those killed in and around the mines were hand loaders; in 1934, 31.4 percent were hand loaders; in 1935, 31.7 percent were hand loaders; and in 1936, 34.4 percent were hand loaders. In the 3 years 1934-36, inclusive, 85 (32.5 percent) of those killed in and around the mines were hand loaders, and of those killed by falls of roof, sides, or face (139), 67 (48.2 percent) were hand loaders.

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It is realized that the hand loader may not be able to guard himself against all of the hazards in a coal mine, but there is no reason why he cannot protect himself from roof falls and many other hazards. The "speed-up" system should not be involved in the fatalities to hand loaders due to falls of roof, face, and sides, as there is no reason why he should not test the roof carefully and either pull down or timber loose roof, particularly at the face, where most of the fatalities occur.

Some hand-loading mines in Illinois as well as some mechanical-loading mines have made good safety records. Because a mine is mechanized is no reason why it cannot be operated safely. The mechanized mine that is operated on the "speed-up" system is very likely to have a higher accident rate and production cost. Some of the mines that have made the greatest progress in accident prevention are mechanized mines; in fact, according to data available, the mine with the lowest accident rate in the State is one of the largest producers and is mechanized throughout.

Regardless of whether hand or mechanical loading is used, mines can be made as safe as the operators and miners want to make them. Both have their responsibilities and should recognize them as well as the existing hazards instead of ignoring them. When the operators and miners cooperate in reducing the hazards and in establishing and maintaining a system of safe practices, the accident rate can be reduced at least 75 percent and the mines made comparatively safe.

CONCLUSIONS

Although Illinois has made progress in accident prevention, the rate is far higher than it should be; therefore, there should be a better-organized State movement to reduce accidents. Operators should make their mines as safe as possible and adopt well-considered safety rules. Workers and operators should cooperate in enforcing safety rules and eliminating unsafe practices.

As falls of roof, sides, and face have been responsible for more than 50 percent of the fatalities from 1882-1936, inclusive, an organized drive should be made against this class of accidents, as the problem of roof falls is not too great to solve; the same is true of haulage accidents, which have been responsible for more than 18 percent of the fatalities in Illinois mines during the period studied. A remarkable showing could be made in the accident rate of the State if the rate due to these two causes were reduced, and unquestionably fulfillment of this objective is not at all an impossibility, as has been proven in several cases in individual mines in Illinois.

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